

## **Water Right Transfer Policies and Procedures Water Measurement Requirements and Specifications**

### **1. Purpose**

Section 5d(16) of the Transfer Processing Policies and Procedures (**Administrator's Memorandum, Transfer Processing No. 24, October 30, 2002**) provides that water right transfers authorizing one or more changes to the diversion and use of ground water that are approved after October 30, 2002 shall include conditions requiring installation of flow meters and recording devices. This document provides detailed specifications for the flow meters and recording devices acceptable to the Director of IDWR in accordance with the Transfer Processing Policies (hereinafter referred to as Transfer Procedures) and Section 42-701, Idaho Code.

### **2. Scope of Requirements**

These measurement requirements and specifications apply only to water right transfers made within the Eastern Snake Plain Aquifer (ESPA) that are approved after October 30, 2002. These requirements however may apply to any water right transfers within Idaho upon the discretion of the Director of IDWR.

These measurement requirements and specifications will be made available to transfer applicants at the time the transfer is filed with IDWR. They will also be made available as a link on IDWR's Internet site. Applicants must submit an adequate description of the proposed diversion, delivery, application system(s) and measuring devices to IDWR in accordance with Section 3 (6)(h) of the Transfer Procedures. The descriptive information provided to IDWR should include that information specified in Section 6 of this document.

### **3. Flow Meter Specifications and Installation Requirements for Closed Conduits**

#### **A. Flow Meter Specifications**

Listed below are the flow meter requirements and specifications for full-flowing closed conduits or pipes. These specifications apply to all irrigation and non-irrigation water uses except simple domestic systems as defined in Section 3C below (refer to Section C for domestic meter specifications). Owners of irrigation diversions may apply to IDWR for a variance of these specifications in accordance with Section 7 of this document, Criteria for Processing Requests for Variance of Measuring Device Requirements for Approved ESPA Water Right Transfers.

Meters shall be magnetic flow meters meeting the following minimum specifications:

- 1) Flow range of 0.1 to 33 feet per second (fps).
- 2) Listed manufacturer accuracy of +/- 0.5% of flow rate from 1.6 to 33 fps, and +/- 2% of flow rate from 0.1 to 1.5 fps.
- 3) Required Output: Scaled pulse frequency output (or pulse counting) is required for cumulative totalized volume. This output signal is required for continuous recording of totalized volume data on data loggers. Output signals must be compatible with data logger inputs (see data logger specifications below).  
Optional Output: Analog output signal for flow rate (usually 4-20mA) is not required but is optional (most magnetic flow meters provide both analog and pulse frequency as standard output signals).
- 4) The register or display unit shall:
  - a) Have a waterproof and tamperproof seal.
  - b) Have an LCD backlit display unit to display instantaneous flow rate and totalized volume.
  - c) Have a minimum of six (6) digits for flow rate.
  - d) Have a minimum of eight (8) digits for totalized volume display or a sufficient number of digits so that "rolling over" will not occur within two years operation, based on the maximum rate of flow and annual volume elements of the authorizing water rights.
  - e) Be non-volatile and non-resettable.
  - f) Have all settings and data protected by battery back up (battery as specified by manufacturer).
- 5) The display unit must contain user programmable features that allow the selection of flow units that must include but are not limited to: gallons per minute (gpm) and cubic feet per second (cfs). The meter flow rate display must also allow decimal display formatting of up to 3 places when using cfs units. The volume totalizer display must contain user programmable features that allow the selection of volumetric units that must include but are not limited to: total gallons or cumulative acre-feet. The meter must also allow decimal display formatting of up to 4 places, and the application of unit multipliers ranging from .0001 to 10,000.

#### B. Meter Installation and Diversion System Requirements

Meters required under Section 3A. above shall meet the following installation requirements:

- 1) The minimum and maximum system operating flows and pressures must be fully within the range of measurable flows and pressures identified in the meter specifications.
- 2) Pipes must be full flowing.
- 3) The installed accuracy of the meter must be within +/- 10.0% of rate of flow as compared to a second, standard flow meter.
- 4) Meters must be installed in accordance with manufacturer's specifications. Most manufacturers recommend that meters be placed at least 10 pipe diameters downstream, and 5 pipe diameters upstream of minor turbulence causing fittings

such as discharge heads, single elbows, and valves, and farther downstream if the disturbance is more severe.

- 5) Meter Certification: IDWR will certify the installed flow meter for accuracy using a second, standard flow meter. A location for measuring flow with a second standard meter must be provided as close to the installed meter as possible. A section of straight pipe, at least 10 pipe diameters in length, and free of elbows, valves and other fittings, must be available and must contain the same flows that are passing through the meter. The 10-diameter certification section may be incorporated into the manufacturer's pipe requirements above and below the flow meter, but in no case shall this straight section be less than 3 feet.

#### C. Flow Meter Specifications and Requirements for Simple Domestic Systems

A simple domestic system is one defined as a single well with service lines to a single home and water uses limited to in-home use plus lawn and/or garden irrigation not exceeding one-half (1/2) acre. Any transfer approved pursuant to the Transfer Procedures that results in the installation of a new simple domestic system will be required to install totalizing flow meters. In these cases only, the flow meter requirements are the same as those found in IDWR's *Minimum Acceptable Standards for Measurement and Reporting of Surface and Ground Water Diversions*. New and existing domestic wells approved pursuant to the Transfer Procedures that are used for any other purposes (for example stock water or commercial uses) are not simple systems and will be required to install magnetic flow meters and data logger in accordance with sections 3 and 4 of this document.

### 4. Recording Device or Data Logger Requirements

A flow meter recording device shall be installed with any flow meter installation required pursuant to the Transfer Procedures. IDWR will only accept use of electronic data loggers as recording devices with flow meters required by the Transfer Procedures (except for simple domestic systems). Data loggers shall meet the following minimum specifications:

- 1) Input Channel Minimum Requirement: Minimum of one pulse counting input channel capable of recording daily cumulative totalized volume.  
Optional Input Channel: One analog input channel to be compatible with flow meter output analog signal (generally 4-20mA for magnetic or other flow meters).
- 2) Memory/Data Storage: Minimum 6500 data values.
- 3) Communications/Serial Interface: RS232 compatible.
- 4) Operating Temperature Range: -10° to 60°C
- 5) Power: Battery as per data logger specifications with a life of approximately one year **or**, use direct AC or DC power source (generally requires conversion of AC to DC).
- 6) Enclosure: Data loggers should be enclosed in a plastic, PVC or metal box to protect wire and other electronic connections from moisture and debris. Data

loggers that are installed outdoors and not within a building or shed should be installed in an enclosure meeting NEMA 4 requirements.

Any water right holder who is required to install a data logger that uses the manufacturer's required battery as the sole power source must also obtain an additional battery for back-up or replacement purposes.

#### A. IDWR Recommended Data Loggers

There are many different data logger manufacturers and models available on the market today that can potentially be used with the flow meters required by the Transfer Procedures. Software and data formats vary among manufacturers and data logger models. It is the goal of IDWR to minimize problems associated with using different loggers and software, and to maximize consistency with data formatting, equipment, and training. In order to move toward this goal, IDWR will accept data loggers meeting the minimum specifications above from the following manufacturers:

##### Data Logger Manufacturer

Telog Instruments, Inc.

Logic Beach, Inc.

Global Water Instrumentation, Inc.

Campbell Scientific, Inc.

IDWR may consider use of data loggers from other manufacturers if the water right transfer applicant or right holder submits a written petition to IDWR seeking a variance from the current data logger specifications. Any applicant proposing to use a data logger from a different manufacturer must submit detailed specifications of the proposed data logger model with the written petition. The water right holder must receive approval from IDWR to install a data logger model from a different manufacturer.

## **5. Implementation Procedures**

Purchase, installation and maintenance of flow meters and or data loggers shall be the responsibility of the water right holder after the water right transfer is approved. ESPA Water District watermasters or IDWR staff will inspect and certify the meter installation after it is completed. It shall be the responsibility of the water user to correct any flow meter installation which is not to manufacturer's specification, or which is causing a meter to operate outside of the installed accuracy limit of +/- 10.0%, or which does not include adequate piping for certification measurements as specified in Section 3 (C)(5). If at any time the required flow meter fails to function properly, the water user shall promptly initiate action to repair or replace the meter, correct any problems with the installation of the meter, and notify IDWR or the water district of the corrective actions.

ESPA Water District watermasters or IDWR staff shall be responsible for downloading data from data loggers. Data shall be downloaded approximately every 120

days. Data retrieved from the data loggers by the water districts or IDWR staff shall be maintained and archived by the water districts and IDWR. Data reports may be provided to the right holder upon request. Water district watermasters or IDWR staff may replace data logger batteries if necessary using the right holders replacement battery or a replacement battery owned by IDWR or the water district. The right holder must either provide a replacement battery or pay for the cost of a replacement battery directly to IDWR or the water district.

## **6. Water Measurement and Diversion System Description Requirements**

In accordance with Section 3 (6)(h) of the Transfer Procedures, transfer applicants must provide to IDWR an adequate description of the proposed diversion, delivery, application system(s) and measuring devices. Information required by Section 3 (6) (h) must include:

- Dimensions of pumps, pipelines, ditches, dams, impoundments and application equipment.
- The type and location of measuring devices.

To avoid delays in transfer application review, it will be helpful to present the required information above by providing the following specific items:

- Schematic or diagram showing location and dimensions of well or wells, water distribution lines from well(s), location of measuring devices including length of straight unobstructed pipe upstream and downstream of the meter, location of all tees, valves and gages, and other delivery and application system information.
- Meter manufacturer, meter type and copy of meter specifications if available at the time the transfer application is submitted.
- Data Logger/recording device manufacturer, model and copy of data logger specifications if available at the time the transfer application is submitted.

## **7. Criteria for Processing Requests for Variance of Measuring Device Requirements for Approved ESPA Water Right Transfers**

Section 5d(16) of the Transfer Procedures provides that “Holders of ground water rights approved for transfer for diversion through existing systems may request a variance from the above requirements, which may or may not be granted”. This section provides criteria for processing, reviewing and approving Requests for Variance of flow meter requirements under the Transfer Procedures. These criteria apply to existing diversion systems that are presently using either the PCC method of measurement, or an existing flow meter. These criteria also apply to any new irrigation diversion and system that is approved pursuant to the Transfer Procedures.

#### A. General Process Requirements

- 1) Requests shall be considered only for existing measured diversions and new irrigation diversions.
- 2) Requests must be approved by IDWR prior to diversion of water under the approved transfer.
- 3) Submission of requests must be in writing to IDWR, and must contain all information required to make a determination. The request for variance will be returned to the water user if insufficient information is supplied to process the request.
- 4) Variance approvals may be subject to re-evaluation on an annual basis and may or may not be approved for a subsequent year.
- 5) Both IDWR and the applicable Water District watermaster, or Water Measurement District hydrographer shall review the variance request. The watermaster or hydrographer will provide a written recommendation of each Request for Variance. Upon completion of this recommendation, the request will be approved or denied by IDWR.
- 6) If a request is denied, the water user will be required to install one or more flow meters and data loggers prior to diversion of water in accordance with specifications given in Sections 3 and 4 of this document.

#### B. Minimum Criteria for Reviewing and Approving Requests for Variance

1. Request for Variance Proposing the Power Consumption Coefficient (PCC) Method of Measurement
  - a. The request must contain, at minimum:
    - i) The water right number(s) that will be affected by the variance.
    - ii) Schematic drawing or diagram depicting pipe sizes and configuration of pumping plant including location of all valves, gages, tees, booster pumps, and all distances between fittings.
    - iii) Motor horsepower, demand meter serial number, electrical provider name, electric account number and billing name, account service number and/or other identifying numbers.
    - iv) Location of mainlines and irrigation equipment mapped on 1:24,000 scale quadrangle or an ortho photo quad map or larger.
    - v) A brief narrative describing the irrigation set patterns and all system operating conditions, including estimated rate of flow and mainline pressure under each condition.
  - b. The pumping plant must have a dedicated electric power demand meter that does not supply power to re-lift pumps, structures, heaters, or other equipment. The only exceptions are booster pumps that are an integral part of the pumping plant, and pivots or linear drive systems that are served by the pumping plant.
  - c. Energy sources other than electric cannot be considered.
  - d. The system must operate under either a single constant operating condition, or not more than three (3) distinct constant operating conditions

with resulting PCC values that are within 10% of each other. An operating condition is defined as a specific combination of discharge, wellhead pressure and power demand that may be measured under a normal irrigation set operation. Systems that have been fitted with variable speed or variable frequency drive motors are usually not eligible because of the numerous operating conditions that are possible under that configuration.

- e. The diversion system must contain a sufficient length (equivalent to at least 10 pipe diameters) of straight, unobstructed pipeline at the wellhead so that flow may be measured using a portable sonic-type flow meter.
- f. The pumping plant owner or operator must provide cropping information and power account information annually and must report any system or operational changes.
- g. Ground water pumping levels in the well must not fluctuate more than 10% during the irrigation season.
- h. All variance approvals are subject to field verification. Tests must be conducted by IDWR staff or ESPA Water District staff using a certified standard flow meter. The operator must operate the system for the examiner under all operating conditions so that a PCC value may be determined. If necessary, the test will be repeated on an annual basis at the operator's expense.
- i. Substantive changes to the irrigation system that result in more than three (3) system operating conditions or otherwise make the use of the PCC method invalid, as determined by the reviewer or examiner, will be cause for IDWR to revoke the variance approval and require the installation of a flow meter in accordance with IDWR's Transfer Procedures and specifications given in Sections 3 and 4 of this document.

## 2. Request for Variance Proposing Use of Existing Flow Meter(s)

- a. The request must contain, at minimum:
  - i) The water right number(s) that will be affected by the variance.
  - ii) Schematic drawing or diagram depicting pipe sizes and configuration of pumping plant including the location of the existing meter as well as the location of all valves, gages, tees, booster pumps, length of straight unobstructed pipe upstream and downstream of the meter, and all distances between fittings.
  - iii) Motor horsepower
  - iv) Meter manufacturer specification sheet and/or listing of meter manufacturer, meter type and model number, and meter units of flow and volume, including odometer capacity.
  - v) A brief narrative describing system operation, including minimum and maximum diversion rates.
- b. Proposed meters must meet the following minimum criteria:
  - i) Meters must have a listed minimum manufacturers' design accuracy of +/- 2% of reading.

- ii) Installed flow meter must have an installed accuracy of +/- 10 percent of reading, as compared to a certified standard meter.
- iii) The meter must indicate instantaneous flow and record total accumulated volume, either in gallons or in acre-feet. The meter odometer must contain sufficient digits and/or unit multipliers that it will not “roll-over” to zero within 2 years, based on authorized water right diversion volume. Digital displays must have a non-volatile memory and must not be able to be reset to zero.
- iv) The meter must be installed to manufacturer’s specifications *and* the diversion system must contain additional sufficient length (equivalent to at least 10 pipe diameters) of straight, unobstructed pipeline at the wellhead so that flow may be measured using a sonic-type flow meter.
- c. The water user or a representative must record meter odometer readings on a monthly basis.
- d. All variance approvals are subject to field verification. The installed flow meter must be tested for accuracy by IDWR staff or ESPA Water District staff using a certified standard flow meter. The operator must operate the system for the examiner under all operating conditions so that the meter may be tested over a full range of flows. If necessary, the test will be repeated on an annual basis at the operator’s expense. The water user is responsible for all meter maintenance and replacement costs, and must perform necessary maintenance in a timely manner.
- e. Failure of the operator to properly record monthly readings, or failure of the meter to operate properly and within required accuracy ranges, will be a cause for IDWR to revoke the variance approval and require the installation of a flow meter in accordance with IDWR’s Transfer Procedures and specifications given in Sections 3 and 4 of this document.

### 3. Request for Variance for New Irrigation Diversions

A Request for Variance may be made on a transfer approval involving the installation of a new irrigation diversion that is either a stand-alone diversion system or a diversion that is tied into an existing system. A request may be made that proposes measurement using the PCC method or installation of one or more flow meters and recording devices that are acceptable to IDWR.

- a. The request must contain at minimum all of the information required in Section 7 (B)(1)(a) or (B)(2)(a) above.
- b. Meters proposed to be used must meet the minimum criteria specified in Section 7 (B)(2)(b) above.
- c. All other applicable minimum criteria listed in Section 7 (B)(1) or (B)(2) must be satisfied.